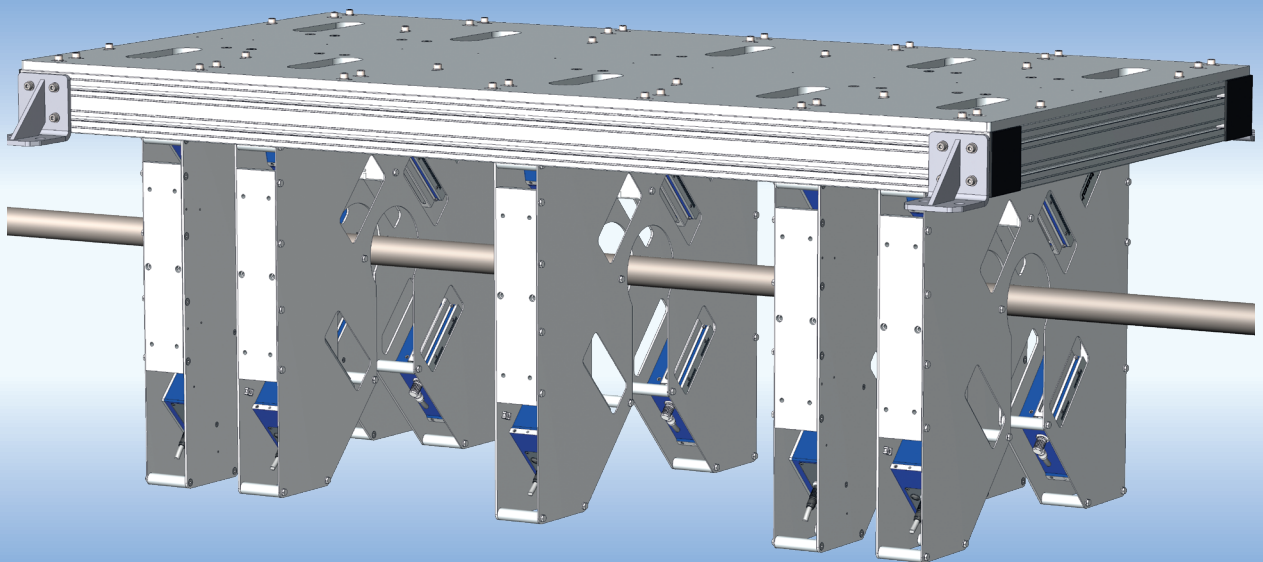


Zumbach

SWISS PRIME MEASURING SINCE 1957

BENDCHECK



**In-Line straightness measurement using
precise non-contact laser diameter gauges**

BENDCHECK – Straightness measurement of Bars and Pipes

This non-contact measuring solution opens tremendous potential to tube and bar manufacturers for in-line quality assurance and is achieved without laborious, manual measurements.

Many manufacturers of pipe and steel bar are constantly challenged to respect straightness specifications that are significant criteria's of quality. Manual inspection stations

are offering only punctual checks without having the entire production under control.

ZUMBACH's BENDCHECK system is installed in-line and measures the straightness of every single product passing through the measuring station without slowing down the production process.

Specific advantages of BENDCHECK

- Synchronous real-time scan to monitor bending of the product
- Optional head and tail bending with additional measuring stations
- 1-, 2- or 3-axis laser measuring stations available depending on product and application
- Direct integration into the production process (customer specific installation)
- Quality assurance after the straightening process; Important to the steel industry
- Collection of statistics for traceability reasons
- No time-consuming and laborious checks with manual tools or off-line stations

Technical specifications

	BENDCHECK 100	BENDCHECK 160	BENDCHECK 230	BENDCHECK 310
Product size	15...90 mm (.59...3.54 in.)	15...150 mm (.59...5.9 in.)	15...210 mm (.59...8.26 in.)	15...290 mm (.59...11.41 in.)
Measurement error				
Diameter (centric)	+/- 4 µm	+/- 5 µm	+/- 7.5 µm	+/- 40 µm
Bend*	+/- 200 µm/m	+/- 400 µm/m	+/- 500 µm/m	+/- 600 µm/m
Repeatability (Standard deviation)				
Diameter (3 stdev)	0.9 µm (0.1 s)	1.2 µm (0.1 s)	1.8 µm (0.1 s)	3 µm (0.1 s)
Bend* (1 stdev)	0.1 mm/m	0.2 mm/m	0.25 mm/m	0.3 mm/m

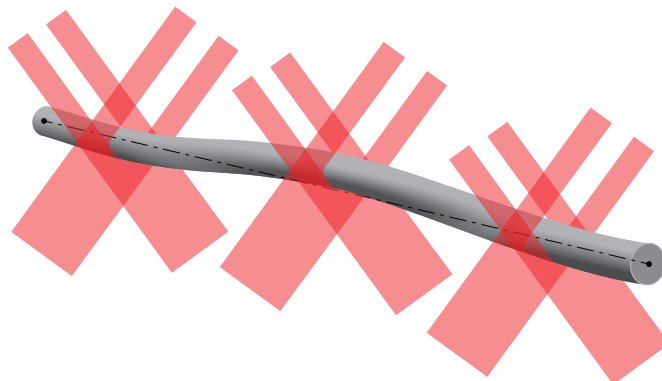
* adequate product guiding is required

Basic System Function

The basic function of the BENDCHECK system is the measurement of bend/deflections of round or flat products. The system measures the position and diameter of the product at 3 defined locations along its axis. BENDCHECK calculates the deviation of position measured by the central measuring head from a virtual straight line. This value is either divided by the distance or by the distance squared. The operator can select the preferred formula for the bend calculation depending product requirements. The measured values such as bend, diameter and ovality of the product is continuously calculated and graphically displayed in the USYS processor unit or available via communication port. With two additional measuring stations, the BENDCHECK

system can additionally measure the head and tail bending of each tube or bar. The relevant measurements for head and tail bending can be displayed in the USYS processor unit and added to the statistics.

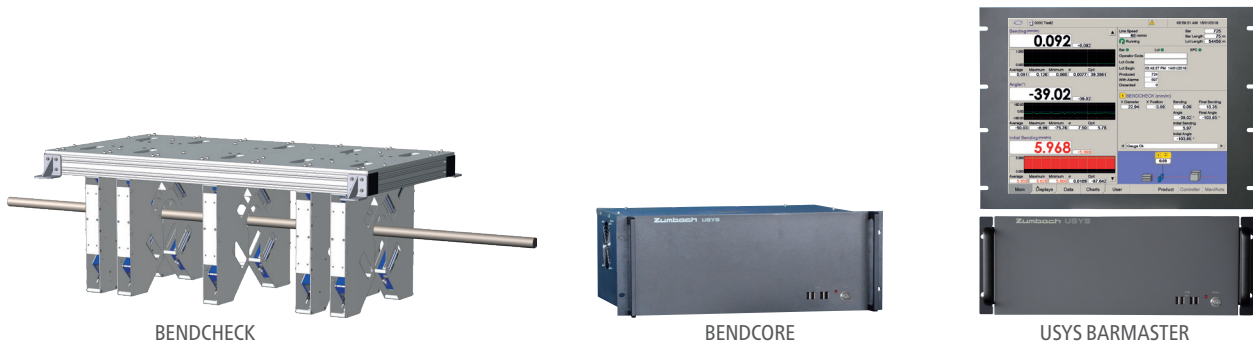
BENDCHECK can be operated in a mode without length/encoder information or in a triggered mode where the measurement steps are actioned depending position pulses generated by an encoder connected to the system. After the product leaves the measurement field, a complete statistic summary is generated for each piece, featuring bend, diameter and ovality measurements. Several pieces can be combined into a lot statistic.



SYSTEMS COMPONENTS

The BENDCHECK system is available in different combinations depending on the integration into the production process and on the product dimension.

BENDCHECK – Complete measuring and display system with 5 measuring stations (including head and tail bending)

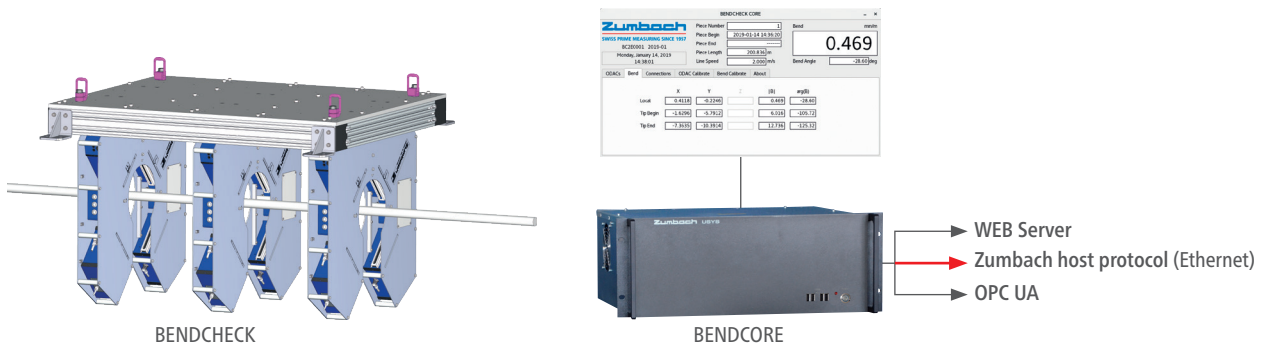


BENDCHECK – Complete measuring and display system with 3 measuring stations



BENDCHECK – Measuring system with Ethernet communication port

For OEM's a simplified setup is available with BENDCHECK measuring station and BENDCORE processor. BENDCORE is offering an Ethernet communication port which makes available all measured values through the host communication protocol. Therefore, BENDCORE can communicate directly with a PLC (programmable logic controller) or PC system without the use of the local display unit.



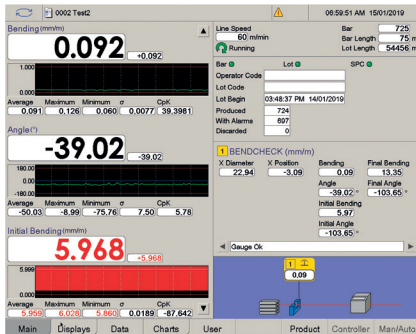
BENDCORE can be extended with a PC monitor for a HMI to configure and calibrate the BENDCHECK system. In addition, BENDCORE offers a built-in Web Server and embedded OPC UA interface (optional).

USYS BARMASTER DISPLAY

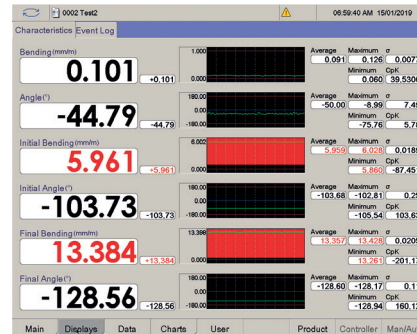
The relevant measurements such as bending, bend angle, diameter and ovality (optionally head and tail bending) are visible at a glance. The USYS BARMASTER can collect statistical information of each piece, but also collect complete lot statistics.

Operation is menu-driven via a separate touch screen with a clearly arranged and easy-to-use user interface for the

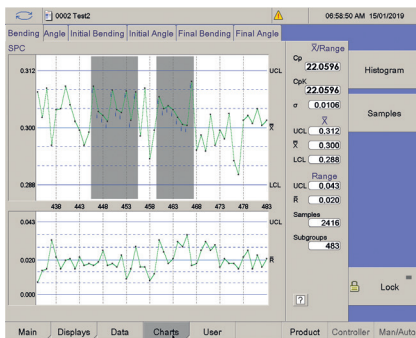
entry/selection of the parameters. The measured values are displayed both numerically and graphically. Line layouts with pictograms of the connected devices are user configurable. Time or length-based trending of all values, extensive statistics with min., max., mean value, standard deviation, Cp and Cpk values are, amongst others, standard displays.



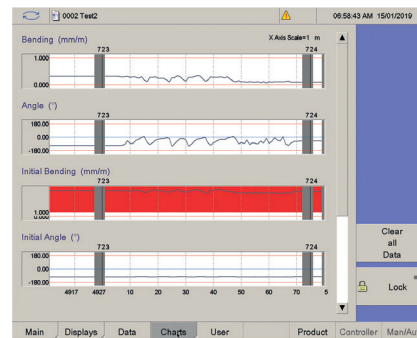
Main display



Display in numeric and graphical form



SPC charts and statistics



Strip charts

COMMUNICATION AND NETWORKING

Today, the ability of processors to communicate with other computers or networks is essential. ZUMBACH offers a variety of communication and interfacing possibilities for the USYS processor to satisfy almost any need and concept.

USYS Data Log

The USYS Data Log is a WINDOWS™ based software for easy data collection from one or several ZUMBACH processors and for saving the data in text or Excel™ files. USYS Data Log communicates to the ZUMBACH processors via a serial RS-232 port or an Ethernet TCP/IP connection.

Windows™ and Excel™ are trademarks of Microsoft Corporation.

USYS Web Server

With this software integrated by default, a USYS processor can be addressed via an Ethernet TCP/IP network (LAN, Intranet, Internet), using a standard browser.

USYS Report Manager

The USYS processor can store in a local or external memory the detailed statistical data calculated for the Piece, Lot and SPC periods.

In this way it is possible to recover and visualize the data of previous productions and reproduce the quality control printed reports.

Embedded OPC UA Server

The OPC-UA protocol is integrated in the measurement system and can be activated as an option. The OPC Unified Architecture (UA) is a

platform-independent machine-to-machine communication framework for industrial automation developed by the OPC Foundation. OPC-UA is the protocol of choice for industrial internet of things (IIoT) and is suitable for data collection and management and for control. The OPC-UA capabilities allow a seamless integration in the area of process control such as SCADA or MES.

- All technical data are subject to change without notice.

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